

0203-AN-065 Marker-assisted Selection for an FHB Resistance Gene Derived from Sumai 3.

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PROJECT ABSTRACT

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Wheat breeders throughout the U.S. are interested in methods to more efficiently select for FHB resistance among their breeding materials. Several breeding programs in the U.S. Wheat & Barley Scab Initiative are just beginning efforts to incorporate FHB resistance into their germplasm. Even with experienced plant pathologists and adequate facilities, this is a formidable task. Our recent work has indicated that a major QTL for FHB resistance in 'Sumai 3' is located on chromosome 3BS. SSR markers have been located that bracket this QTL region (Anderson et al., 2001). DNA markers for FHB resistance genes can reduce the screening workload by identifying those lines that contain resistance genes. For selection based on this QTL region to be useful in breeding it must consistently express increased resistance when introgressed in other germplasm. We have identified near-isogenic materials in well adapted genetic backgrounds that are suitable for testing the robustness of this QTL as a tool to aid in selection for FHB resistance. If successful, this marker-assisted selection approach could be applied prior to any greenhouse or field-based testing for resistance and should increase the efficiency of breeding for resistance by eliminating a large number of lines that do not contain this QTL. This focuses the limited resources of breeding programs on material that is known to carry at least one major gene for FHB resistance.

The objectives of this research are to:

- 1) Test a marker-based method to screen for a Fusarium head blight resistance gene derived from 'Sumai 3' in adapted wheat lines in several genetic backgrounds.
- 2) Test an alternative method of utilizing DNA markers to improve FHB resistance.

F₄-derived materials near-isogenic for the chromosome 3BS QTL have been isolated from our breeding materials. We plan to test 60 pair of homozygous near-isolines (with and without the QTL) plus checks for FHB resistance under greenhouse and field conditions. The FHB reaction of these lines with and without the QTL will be compared to judge the effectiveness of this selection procedure. Additional experiments will be initiated in this funding period to exploit other resistance genes in addition to the 3BS QTL. The initial selection will be for material not containing the 3BS QTL, but high FHB resistance. The 3BS QTL will be backcrossed (via markers) into these highly resistant lines.